

Application Serial N . 09/478,849

Att m y Docket N . CIC-037-US

In the Specification:

Please replace the paragraph beginning on page 4, line 4 with the following:

B₁
A third embodiment 200 of the invention is shown in Fig. 3, wherein the advantages of the previous embodiments are coupled with further improvements to yield an optical system design ideal for a wide field of view magnifier. Such a magnifier can be used in many applications but is particularly ideal for a compact head-mounted display wherein one such system may be used for each eye for stereo viewing. Fig. 3 represents a side-view profile of the imaging system 200, wherein an object 202 is imaged by a compound objective lens 204 to form an intermediate image 208 after reflecting off of a beam splitter 206 and a second-surface concave mirror 210. The light from the intermediate image 208 continues through the beam splitter 206 to be re-imaged by the lens 212 through an exit pupil 214 to form a virtual image 202' located substantially distant from the optical system 200. The object 202 comprises either an actual object or the image of an object, and in the particular case of a head-mounted display, generally comprises the image produced by an electronic imaging device including, but not limited to, a cathode ray tube or liquid crystal display.

Please replace the two (2) consecutive paragraphs beginning on page 7, line 56 with the following:

B₂
This advantage offers yet another embodiment 300 of the invention as shown in Fig. 4. Consider a re-imaging lens which has been optimized to act on an intermediate image formed on a concave projection screen. Now consider that a scanning and modulated laser beam is used to directly form an intermediate image onto the projection screen. Since the exit pupil of the re-imaging lens is substantially independent of the size of the laser beam, the beam can be made so fine that focusing of the beam to form a focused scanning spot will not be required. As shown in Fig. 4, a scanning, modulated image source [310] 310' is placed approximately at the radius of curvature of a concave projection screen 312. The image source [310] 310' produces a fine scanning beam which is modulated in intensity as it scans to form an intermediate image 314 on screen 312. Screen 312 [scatters] redistributes the energy from the image source [310] 310' to fill the [entrance] exit [aperture] pupil 317 of a re-imaging lens 316 which in turn forms a distant virtual image 318 of the intermediate image.

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In accordance with the present invention, the image source [310] 310' comprises any means of forming a fine scanning spot on the projection screen 312 to form the intermediate image 314, including, but not limited to, a monochromatic or polychromatic scanning laser projector. The projection screen 312 comprises any suitable material or device to scatter the light from the intermediate image 314 into the entrance [aperture] pupil of the re-imaging lens 316. Preferably, such scattering will be confined such that all the light from the intermediate image [310] 314 enters and uniformly fills the entrance [aperture] pupil of the lens 316. Note that such a screen material or device may further comprise a surface which not only scatters the energy from the image source [310] 310' but also which may absorb the light and re-emit it as the intermediate image 314. Note further that if the image source is such that polychromatic light is produced wherein each color can be scanned to form a full-color composite intermediate image 314, then each color component intermediate image should be scanned to pre-aberrate the intermediate image to accommodate lateral chromatic aberration in the re-imaging lens 316. Note finally that the [unique combination of] relative independence between the projector beam size and the re-imaging lens [aperture] exit pupil, [and] in combination with the narrow projector beam size, allows the projector to be located off-axis as shown in Fig. 4, providing that the intermediate image formed by the projector is created as an off-axis image. This advantage is made possible by the very long relative depth of focus of the intermediate image.